

At a Glance

What is it?

■ The ability to provide effective indirect fire is defined in the Marine Corps Operational Capability Document, and Marine Corps Universal Need Statement "Mortar Systems," Combat Development and Tracking System. These documents stress the need for mortar systems that are lighter weight and have a reduced life cycle cost when compared to the weapons currently fielded.

How does it work?

■ Coldworked flow formed high temperature nickel superalloy (Inconel 718) replaced the much heavier steel alloy mortar tube. As a result, no cooling fins are required. The flowform manufacturing process reduced fabrication costs by approximately 80 percent.

What will it accomplish?

■ The overall technology effort is to reduce weight, extend operational life, decrease life cycle costs, and maintain fires accuracy. The technology efforts derived a 30 percent total weight reduction for the cannon tube, bipod, and baseplate.

Point of Contact:

Dwight Roberson
(703) 696-5448
dwight.k.roberson1@navy.mil

The Office of Naval Research (ONR) Advanced Weapons Material Technology effort is geared towards reducing the weight of the 60mm and 81mm mortar systems. Since these two weapon systems are man portable,

reducing their weight would reduce the overall weight of combat gear carried by a Marine, which currently is in excess of 120 pounds. In conjunction with weight reduction, the focus was to extend operational use, decrease life cycle costs, and maintain constant fires accuracy over time.

ONR's program was structured to investigate the feasibility and practicality of employing emerging material and manufacturing technologies to the high shock and temperature environment of a mortar weapon system. Computer modeling and simulations were used to project performance and create detailed designs. Designs were produced with the overarching goals of weight reduction, reduction in life cycle cost, and improved ergonomics. The bipod was redesigned using aluminum, titanium, and composite materials yielding a compact design for optimal portability and resulting in the elimination of lubricants. The baseplate was also redesigned using forged high strength aluminum alloy resulting in less weight and improved geometry.

Previous mortar tubes were fabricated from steel alloys that were available over three decades ago. Switching to Inconel 718 extended operational life beyond 10,000 rounds and reduced weight by 30 percent. Likewise, baseplates and bipods are now fabricated using modern materials yielding significant weight reduction, less wear of components, and as a result, constant fires accuracy over time and decreased life cycle costs. A 10 percent reduction in life cycle costs was achieved and a common bipod functionality and form was introduced resulting in a training requirement for the Marine mortarman.



New materials bipod (top) compared to old bipod (bottom).